



UNIVERSITI
TEKNOLOGI
MARA

Cawangan Kedah
Kampus Sungai Petani



e-PROCEEDINGS

of The 5th International Conference
on Computing, Mathematics and
Statistics (iCMS2021)

4-5 August 2021

Driving Research Towards Excellence



**e-Proceedings
of the 5th International Conference on
Computing, Mathematics and Statistics
(iCMS 2021)**

Driving Research Towards Excellence

Editor-in-Chief: Norin Rahayu Shamsuddin

Editorial team:

Dr. Afida Ahamad
Dr. Norliana Mohd Najib
Dr. Nor Athirah Mohd Zin
Dr. Siti Nur Alwani Salleh
Kartini Kasim
Dr. Ida Normaya Mohd Nasir
Kamarul Ariffin Mansor

e-ISBN: 978-967-2948-12-4

DOI

Library of Congress Control Number:

Copyright © 2021 Universiti Teknologi MARA Kedah Branch

All right reserved, except for educational purposes with no commercial interests. No part of this publication may be reproduced, copied, stored in any retrieval system or transmitted in any form or any means, electronic or mechanical including photocopying, recording or otherwise, without prior permission from the Rector, Universiti Teknologi MARA Kedah Branch, Merbok Campus. 08400 Merbok, Kedah, Malaysia.

The views and opinions and technical recommendations expressed by the contributors are entirely their own and do not necessarily reflect the views of the editors, the Faculty or the University.

Publication by
Department of Mathematical Sciences
Faculty of Computer & Mathematical Sciences
UiTM Kedah

TABLE OF CONTENT

PART 1: MATHEMATICS

	Page
STATISTICAL ANALYSIS ON THE EFFECTIVENESS OF SHORT-TERM PROGRAMS DURING COVID-19 PANDEMIC: IN THE CASE OF PROGRAM BIJAK SIFIR 2020 <i>Nazihah Safie, Syerrina Zakaria, Siti Madhihah Abdul Malik, Nur Bains Ismail, Azwani Alias Ruwaidiah Idris</i>	1
RADIATIVE CASSON FLUID OVER A SLIPPERY VERTICAL RIGA PLATE WITH VISCOUS DISSIPATION AND BUOYANCY EFFECTS <i>Siti Khuzaimah Soid, Khadijah Abdul Hamid, Ma Nuramalina Nasero, NurNajah Nabila Abdul Aziz</i>	10
GAUSSIAN INTEGER SOLUTIONS OF THE DIOPHANTINE EQUATION $x^4 + y^4 = z^3$ FOR $x \neq y$ <i>Shahrina Ismail, Kamel Ariffin Mohd Atan and Diego Sejas Viscarra</i>	19
A SEMI ANALYTICAL ITERATIVE METHOD FOR SOLVING THE EMDEN-FOWLER EQUATIONS <i>Mat Salim Selamat, Mohd Najir Tokachil, Noor Aqila Burhanddin, Ika Suzieana Murad and Nur Farhana Razali</i>	28
ROTATING FLOW OF A NANOFUID PAST A NONLINEARLY SHRINKING SURFACE WITH FLUID SUCTION <i>Siti Nur Alwani Salleh, Norfifah Bachok and Nor Athirah Mohd Zin</i>	36
MODELING THE EFFECTIVENESS OF TEACHING BASIC NUMBERS THROUGH MINI TENNIS TRAINING USING MARKOV CHAIN <i>Rahela Abdul Rahim, Rahizam Abdul Rahim and Syahrul Ridhwan Morazuk</i>	46
PERFORMANCE OF MORTALITY RATES USING DEEP LEARNING APPROACH <i>Mohamad Hasif Azim and Saiful Izzuan Hussain</i>	53
UNSTEADY MHD CASSON FLUID FLOW IN A VERTICAL CYLINDER WITH POROSITY AND SLIP VELOCITY EFFECTS <i>Wan Faezah Wan Azmi, Ahmad Qushairi Mohamad, Lim Yeou Jiann and Sharidan Shafie</i>	60
DISJUNCTIVE PROGRAMMING - TABU SEARCH FOR JOB SHOP SCHEDULING PROBLEM <i>S. Z. Nordin, K.L. Wong, H.S. Pheng, H. F. S. Saipol and N.A.A. Husain</i>	68
FUZZY AHP AND ITS APPLICATION TO SUSTAINABLE ENERGY PLANNING DECISION PROBLEM <i>Liana Najib and Lazim Abdullah</i>	78
A CONSISTENCY TEST OF FUZZY ANALYTIC HIERARCHY PROCESS <i>Liana Najib and Lazim Abdullah</i>	89
FREE CONVECTION FLOW OF BRINKMAN TYPE FLUID THROUGH AN COSINE OSCILLATING PLATE <i>Siti Noramirah Ibrahim, Ahmad Qushairi Mohamad, Lim Yeou Jiann, Sharidan Shafie and Muhammad Najib Zakaria</i>	98

RADIATION EFFECT ON MHD FERROFLUID FLOW WITH RAMPED WALL TEMPERATURE AND ARBITRARY WALL SHEAR STRESS	106
<i>Nor Athirah Mohd Zin, Aaiza Gul, Siti Nur Alwani Salleh, Imran Ullah, Sharena Mohamad Isa, Lim Yeou Jiann and Sharidan Shafie</i>	

PART 2: STATISTICS

A REVIEW ON INDIVIDUAL RESERVING FOR NON-LIFE INSURANCE	117
<i>Kelly Chuah Khai Shin and Ang Siew Ling</i>	
STATISTICAL LEARNING OF AIR PASSENGER TRAFFIC AT THE MURTALA MUHAMMED INTERNATIONAL AIRPORT, NIGERIA	123
<i>Christopher Godwin Udombosu and Gabriel Olugbenga Ojo</i>	
ANALYSIS ON SMOKING CESSATION RATE AMONG PATIENTS IN HOSPITAL SULTAN ISMAIL, JOHOR	137
<i>Siti Mariam Norrulashikin, Ruzaini Zulhusni Puslan, Nur Arina Bazilah Kamisan and Siti Rohani Mohd Nor</i>	
EFFECT OF PARAMETERS ON THE COST OF MEMORY TYPE CHART	146
<i>Sakthiseswari Ganasan, You Huay Woon and Zainol Mustafa</i>	
EVALUATION OF PREDICTORS FOR THE DEVELOPMENT AND PROGRESSION OF DIABETIC RETINOPATHY AMONG DIABETES MELLITUS TYPE 2 PATIENTS	152
<i>Syafawati Ab Saad, Maz Jamilah Masnan, Karniza Khalid and Safwati Ibrahim</i>	
REGIONAL FREQUENCY ANALYSIS OF EXTREME PRECIPITATION IN PENINSULAR MALAYSIA	160
<i>Iszuanie Syafidza Che Ilias, Wan Zawiah Wan Zin and Abdul Aziz Jemain</i>	
EXPONENTIAL MODEL FOR SIMULATION DATA VIA MULTIPLE IMPUTATION IN THE PRESENT OF PARTLY INTERVAL-CENSORED DATA	173
<i>Salman Umer and Faiz Elfaki</i>	
THE FUTURE OF MALAYSIA'S AGRICULTURE SECTOR BY 2030	181
<i>Thanusha Palmira Thangarajah and Suzilah Ismail</i>	
MODELLING MALAYSIAN GOLD PRICES USING BOX-JENKINS APPROACH	186
<i>Isnewati Ab Malek, Dewi Nur Farhani Radin Nor Azam, Dinie Syazwani Badrul Aidi and Nur Syafiqah Sharim</i>	
WATER DEMAND PREDICTION USING MACHINE LEARNING: A REVIEW	192
<i>Norashikin Nasaruddin, Shahida Farhan Zakaria, Afida Ahmad, Ahmad Zia Ul-Saufie and Norazian Mohamaed Noor</i>	
DETECTION OF DIFFERENTIAL ITEM FUNCTIONING FOR THE NINE-QUESTIONS DEPRESSION RATING SCALE FOR THAI NORTH DIALECT	201
<i>Suttipong Kawilapat, Benchlak Maneeton, Narong Maneeton, Sukon Prasitwattanaseree, Thoranin Kongsuk, Suwanna Arunpongpaisal, Jintana Leejongpermpool, Supattra Sukhawaha and Patrinee Traisathit</i>	

ACCELERATED FAILURE TIME (AFT) MODEL FOR SIMULATION PARTLY INTERVAL-CENSORED DATA	210
<i>Ibrahim El Feky and Faiz Elfaki</i>	
MODELING OF INFLUENCE FACTORS PERCENTAGE OF GOVERNMENTS' RICE RECIPIENT FAMILIES BASED ON THE BEST FOURIER SERIES ESTIMATOR	217
<i>Chaerobby Fakhri Fauzaan Purwoko, Ayuning Dwis Cahyasari, Netha Aliffia and M. Fariz Fadillah Mardianto</i>	
CLUSTERING OF DISTRICTS AND CITIES IN INDONESIA BASED ON POVERTY INDICATORS USING THE K-MEANS METHOD	225
<i>Khoirun Niswatin, Christopher Andreas, Putri Fardha Asa OktaviaHans and M. Fariz Fadilah Mardianto</i>	
ANALYSIS OF THE EFFECT OF HOAX NEWS DEVELOPMENT IN INDONESIA USING STRUCTURAL EQUATION MODELING-PARTIAL LEAST SQUARE	233
<i>Christopher Andreas, Sakinah Priandi, Antonio Nikolas Manuel Bonar Simamora and M. Fariz Fadillah Mardianto</i>	
A COMPARATIVE STUDY OF MOVING AVERAGE AND ARIMA MODEL IN FORECASTING GOLD PRICE	241
<i>Arif Luqman Bin Khairil Annuar, Hang See Pheng, Siti Rohani Binti Mohd Nor and Thoo Ai Chin</i>	
CONFIDENCE INTERVAL ESTIMATION USING BOOTSTRAPPING METHODS AND MAXIMUM LIKELIHOOD ESTIMATE	249
<i>Siti Fairus Mokhtar, Zahayu Md Yusof and Hasimah Sapiri</i>	
DISTANCE-BASED FEATURE SELECTION FOR LOW-LEVEL DATA FUSION OF SENSOR DATA	256
<i>M. J. Masnan, N. I. Maha3, A. Y. M. Shakaf, A. Zakaria, N. A. Rahim and N. Subari</i>	
BANKRUPTCY MODEL OF UK PUBLIC SALES AND MAINTENANCE MOTOR VEHICLES FIRMS	264
<i>Asmahani Nayan, Amirah Hazwani Abd Rahim, Siti Shuhada Ishak, Mohd Rijal Ilias and Abd Razak Ahmad</i>	
INVESTIGATING THE EFFECT OF DIFFERENT SAMPLING METHODS ON IMBALANCED DATASETS USING BANKRUPTCY PREDICTION MODEL	271
<i>Amirah Hazwani Abdul Rahim, Nurazlina Abdul Rashid, Abd-Razak Ahmad and Norin Rahayu Shamsuddin</i>	
INVESTMENT IN MALAYSIA: FORECASTING STOCK MARKET USING TIME SERIES ANALYSIS	278
<i>Nuzlinda Abdul Rahman, Chen Yi Kit, Kevin Pang, Fauhatuz Zahroh Shaik Abdullah and Nur Sofiah Izani</i>	

PART 3: COMPUTER SCIENCE & INFORMATION TECHNOLOGY

- ANALYSIS OF THE PASSENGERS' LOYALTY AND SATISFACTION OF AIRASIA PASSENGERS USING CLASSIFICATION** 291
Ee Jian Pei, Chong Pui Lin and Nabilah Filzah Mohd Radzuan
- HARMONY SEARCH HYPER-HEURISTIC WITH DIFFERENT PITCH ADJUSTMENT OPERATOR FOR SCHEDULING PROBLEMS** 299
Khairul Anwar, Mohammed A.Awadallah and Mohammed Azmi Al-Betar
- A 1D EYE TISSUE MODEL TO MIMIC RETINAL BLOOD PERFUSION DURING RETINAL IMAGING PHOTOPLETHYSMOGRAPHY (IPPG) ASSESSMENT: A DIFFUSION APPROXIMATION – FINITE ELEMENT METHOD (FEM) APPROACH** 307
Harnani Hassan, Sukreen Hana Herman, Zulfakri Mohamad, Sijung Hu and Vincent M. Dwyer
- INFORMATION SECURITY CULTURE: A QUALITATIVE APPROACH ON MANAGEMENT SUPPORT** 325
Qamarul Nazrin Harun, Mohamad Noorman Masrek, Muhamad Ismail Pahmi and Mohamad Mustaqim Junoh
- APPLY MACHINE LEARNING TO PREDICT CARDIOVASCULAR RISK IN RURAL CLINICS FROM MEXICO** 335
Misael Zambrano-de la Torre, Maximiliano Guzmán-Fernández, Claudia Sifuentes-Gallardo, Hamurabi Gamboa-Rosales, Huizilopoztli Luna-García, Ernesto Sandoval-García, Ramiro Esquivel-Felix and Héctor Durán-Muñoz
- ASSESSING THE RELATIONSHIP BETWEEN STUDENTS' LEARNING STYLES AND MATHEMATICS CRITICAL THINKING ABILITY IN A 'CLUSTER SCHOOL'** 343
Salimah Ahmad, Asyura Abd Nassir, Nor Habibah Tarmuji, Khairul Firhan Yusob and Nor Azizah Yacob
- STUDENTS' LEISURE WEEKEND ACTIVITIES DURING MOVEMENT CONTROL ORDER: UİTM PAHANG SHARING EXPERIENCE** 351
Syafıza Saila Samsudin, Noor Izyan Mohamad Adnan, Nik Muhammad Farhan Hakim Nik Badrul Alam, Siti Rosiah Mohamed and Nazihah Ismail
- DYNAMICS SIMULATION APPROACH IN MODEL DEVELOPMENT OF UNSOLD NEW RESIDENTIAL HOUSING IN JOHOR** 363
Lok Lee Wen and Hasimah Sapiri
- WORD PROBLEM SOLVING SKILLS AS DETERMINANT OF MATHEMATICS PERFORMANCE FOR NON-MATH MAJOR STUDENTS** 371
Shahida Farhan Zakaria, Norashikin Nasaruddin, Mas Aida Abd Rahim, Fazillah Bosli and Kor Liew Kee
- ANALYSIS REVIEW ON CHALLENGES AND SOLUTIONS TO COMPUTER PROGRAMMING TEACHING AND LEARNING** 378
Noor Hasnita Abdul Talib and Jasmin Ilyani Ahmad

PART 4: OTHERS

- ANALYSIS OF CLAIM RATIO, RISK-BASED CAPITAL AND VALUE-ADDED INTELLECTUAL CAPITAL: A COMPARISON BETWEEN FAMILY AND GENERAL TAKAFUL OPERATORS IN MALAYSIA** 387
Nur Amalina Syafiqa Kamaruddin, Norizarina Ishak, Siti Raihana Hamzah, Nurfadhlina Abdul Halim and Ahmad Fadhly Nurullah Rasade
- THE IMPACT OF GEOMAGNETIC STORMS ON THE OCCURRENCES OF EARTHQUAKES FROM 1994 TO 2017 USING THE GENERALIZED LINEAR MIXED MODELS** 396
N. A. Mohamed, N. H. Ismail, N. S. Majid and N. Ahmad
- BIBLIOMETRIC ANALYSIS ON BITCOIN 2015-2020** 405
Nurazlina Abdul Rashid, Fazillah Bosli, Amirah Hazwani Abdul Rahim, Kartini Kasim and Fathiyah Ahmad@Ahmad Jali
- GENDER DIFFERENCE IN EATING AND DIETARY HABITS AMONG UNIVERSITY STUDENTS** 413
Fazillah Bosli, Siti Fairus Mokhtar, Noor Hafizah Zainal Aznam, Juaini Jamaludin and Wan Siti Esah Che Hussain
- MATHEMATICS ANXIETY: A BIBLIOMETRIX ANALYSIS** 420
Kartini Kasim, Hamidah Muhd Irpan, Noorazilah Ibrahim, Nurazlina Abdul Rashid and Anis Mardiana Ahmad
- PREDICTION OF BIOCHEMICAL OXYGEN DEMAND IN MEXICAN SURFACE WATERS USING MACHINE LEARNING** 428
Maximiliano Guzmán-Fernández, Misael Zambrano-de la Torre, Claudia Sifuentes-Gallardo, Oscar Cruz-Dominguez, Carlos Bautista-Capetillo, Juan Badillo-de Loera, Efrén González Ramírez and Héctor Durán-Muñoz

ANALYSIS OF CLAIM RATIO, RISK-BASED CAPITAL AND VALUE-ADDED INTELLECTUAL CAPITAL: A COMPARISON BETWEEN FAMILY AND GENERAL TAKAFUL OPERATORS IN MALAYSIA

Nur Amalina Syafiqa Kamaruddin¹, Norizarina Ishak², Siti Raihana Hamzah³, Nurfadhlina Abdul Halim⁴ and Ahmad Fadhly Nurullah Rasade⁵

^{1,2,3,4}Faculty of Science and Technology, Universiti Sains Islam Malaysia, 71800 Nilai, Malaysia

⁵Faculty of Economics and Muamalat, Universiti Sains Islam Malaysia, 71800 Nilai, Malaysia

(¹amalsyfq@gmail.com, ²norizarina@usim.edu.my, ³sraihana@usim.edu.my,

⁴nurfadhlina@usim.edu.my, ⁵fadlynurullah@usim.edu.my)

Insurance industry played important roles in world especially in well-developed countries. Takaful which has been getting on-going popularity in insurance sector must maintain good market growth. Thus, this study aimed to assess the financial performance of Takaful operators through Claim Ratio, Risk-Based Capital (RBC) and Intellectual Capital. The study was conducted using panel data set of 15 listed Takaful operators in Malaysia over the period 2015-2019, taken from the operators' audited financial statements. The results were obtained by computing Claim Ratio, minimum capital level required in RBC and the Value-Added Intellectual Capital (VAIC) score. The result of Claim Ratio showed that family takaful fund has higher Claim Ratio which indicated low profit as compared to general takaful fund. The RBC result also supported that the general takaful performed better than most of family takaful by fulfilled the supervisory target capital level of 130% as required by Bank Negara Malaysia (BNM). As for VAIC score, most of the Takaful operators showed positive VAIC scores which mean they able to fully utilized company's resources that lead to an out-standing management leader stewardship. This study further assists Takaful operators to incorporate the Intellectual Capital method for better improvement in assessing their future performance.

Keywords: Takaful, Claim Ratio, Risk-Based Capital, Intellectual Capital

1. Introduction

Takaful is an Islamic insurance form in which participants contribute money to a pool scheme in order to guarantee each other against liability or injury with regards to the Islamic principle called Shariah. The pool of donations received creates the Takaful fund. Any claims submitted by participants are compensated out of the takaful fund and the remaining surplus after taking into consideration of future claims estimation will be share together among the participants. A takaful operator is entrusted to manage the fund, who runs the operation commercially as a business venture for profit. The takaful industry is being supervised by BNM under Takaful Act 1984. In order to assess financial strength of insurance companies, many popular methods have been widely introduced which resulted in different outcomes and interpretations on the financial performance of that particular insurer. RBC is a method of determining the required amount of capital necessary for a reporting agency to finance its overall business activities considering the scale and level of risks. RBC restricts the level of risk a business can face since it applies concept greater amount of risks comes with greater amount of capital that business entity must hold. The creation of calculation frameworks that better describe the intangible preferences of financial institutions which represent values overlooked by existing accounting practices is among the major concerns. Although physical capital is vital to successful operations, the focus on human resources and talent capabilities is critical to fostering business success. According to Bontis (1998), the growing influence of human capital are among defining characteristic of modern economy which has now gained considerable attention of influential factors such as economic rivalry. This could be recommended to encourage enterprises improve its performance, Intellectual Capital seems to have become an essential aspect.

According to BNM (2018), health insurance and family takaful steady increase within lower 40% income level known as B40 is extremely low relative to general insurance and takaful, with such a policy held by just 30.3%. Because of a lack of knowledge regarding services and products, the Malaysian industry is affected by poor insurance penetration. Through the start to the end of 2019, the launch of the latest B40 scheme which is known as mySalam succeeded to extend both conventional insurance and takaful coverage of protection. This initiative will continue to expand market share for insurers in upcoming years (Insurance Services Malaysia, 2019). Thus, this study fills in the gap by extending the usage of Intellectual Capital as one of the approaches in analyzing performance of takaful operators. This study aims to evaluate the financial performance of Takaful operators in Malaysia through Claim Ratio, RBC and VAIC approaches. This study is expected to help researcher or rating firm to discover whether VAIC is useful in evaluating the performance of insurance companies so they can apply and improve this method in future. This research also helps students and business person that have interest in finance or insurance to get better knowledge and to guide them in more crucial future research on this topic whereby the financial performance is a common financial indicator that been widely used.

2. Literature Review

2.1 Background of Malaysian Takaful Operators

BNM adopts a risk-based supervisory strategy for insurers and Takaful, to ensure the integrity and financial soundness of the insurance industry. The amount of the capital that they must reserve in order to survive during any financial crisis which is the level of capital required by BNM is 130%. Whichever insurance operators who do not fulfill the level of capital required by BNM will undergo stricter supervisory actions or restructuring measures.

Threat leading to unpredictable circumstances including the international economic meltdown and industrial progress, both conventional insurance and Takaful add tremendous value in risk hedging as well as limiting demand for products and growth. Of more than 60% of the Muslim population of 18 million citizens, Malaysia is opening up a big market segment for Takaful industry. The unacceptability of conventional insurance within Muslim people therefore driven the Takaful providers to be founded to meet their customers' demands. He figured out the factors affecting demand of the insurance and Takaful across ASEAN and Middle East Regions by using panel data from 2015 until 2014 on 14 Asian countries whom run both conventional and Takaful insurance. At the end of the study, income, financial sector and urbanization did influence demand of both conventional and Takaful insurances meanwhile it was opposite for dependency ratio (Akhter and Khan, 2015).

According to Husin (2019), the takaful market in Malaysia has witnessed substantial development despite being relatively new. While the Malaysian government is working to improve takaful and make the nation a Shariah insurance powerhouse in Southeast Asia, several concerns have emerged that might stifle the country's takaful growth potential. He also applauds the BNM governor's statement in 2018 that certain takaful workers, who are among the most well qualified, are paid 15% less than conventional labor.

2.2 Approaches Used in Assessing Financial Performance of Insurance Industry

2.2.1 Claim Ratio

A study found that insurance providers are actively checking for ways of avoiding the accumulation of claims and boost the policyholders' cumulative claims satisfaction. But late on, the unwavering fascination with top-line growth leads insurers to consider all risks to raise market share but instead engage in the signing of claims. Worse still, insurance firms appear to always be lacking track of the fact that lawsuits are the firm's main platform and yet are determined by their clients on their track of claims. Then, he studied the effect of Claim Ratio since the high underwriting loss affect non-life insurance companies in India along with its relationship on net premium income and performance of twenty-four public and private non-life insurance companies. He distinguished claim history of both

types of non-life insurance companies using two-independent sample t-test. the data collected based on 10-year interval from 2002 to 2003 until 2011 to 2012. As a result, strong correlation exists between Net Premium Income and Claim Ratio in non-life insurance companies with no difference in claim history of public and private life insurers (Das, 2017).

Muhamat (2017) stated it is vital to know that profit gains from general takaful sector are being used by the takaful operator to optimize the value of the takaful contribution whereas short-term contract terms schemes were often included in general takaful. Therefore, the financial health of the takaful operator would be impaired by plenty of claims events. He further studied how factors highlighted in various articles such as number of accidents, fraud on Takaful claims and the amount coverage protection affected the claims of general insurance over 10 years period. The results were obtained through descriptive analysis, correlation and computation of Claim Ratio which then concluded that all three factors had positive impacts towards company's takaful claim. This proved the importance of Claim Ratio as the tool to evaluate the condition of Takaful claim.

2.2.2 Risk-Based Capital

Tarsono (2019) studied seventeen life insurance companies listed under Indonesia Stock Exchange market that being affected by Net Premium Growth, Claim Ratio and RBC on their financial performances. The data collected from 2014 to 2018 through Insurance Statistics of which those companies had registered on Financial Services Authority (OJK). The performance of insurance companied measured using ROA against the three independent variables of NPG, Claim Ratio and RBC. Due to nonexistence of any random or common effects, fixed effect regression model has been selected using Chow test and Hausman test. He found that both Net Premium Growth and Claim Ratio did not influence the financial performance, instead RBC was the only one affected it.

Nasution (2019) studied performance of fifteen insurance companies through financial ratios analysis while make comparisons on minimum RBC achievable by Islamic insurance companies in Indonesia and Takaful operators in Malaysia against the minimum regulatory RBC requirement. The data collected through financial statements from listed companies that have been registered on OJK and BNM for year 2017 which concluded RBC variable still weak since the standard deviations observed on both countries insurance companies were quite high. Both also being indicated as less ideal due to the liquidity and RBC which fell under required limit. For Malaysian Takaful operators, liquidity, balance of assets and return on investment have a huge impact on the competitiveness of Islamic insurance companies whereby RBC, equity ratio, and fund balance ratio have a major effect on the competitiveness of Indonesian Islamic insurance firms.

2.2.3 Intellectual Capital

According to Nasir & Idris (2017), the VAIC component has a substantial influence on ROA, including variations in the VAIC component having a major effect on the profitability, notably the 39 Islamic financial institutions' return on assets in Malaysia. When contrasted toward other VAIC elements, the other elements of VAIC revealed a statistically significant connection with both ROA and CEE. Despite this, HCE was shown to have no statistically significant impact on ROA. The study revealed that VAIC had no statistically significant effect on ROE when it came to the effects of IC on ROE. Furthermore, both HCE and SCE had a substantial contribution to ROE, with only SCE showing a significant effect on ATO. As a result, the link across IC's efficiency and company success somehow does not appear to have a clear vision.

Kweh (2019) investigated the link between intellectual capital (IC) and company performance, and also the variations in IC's impact on firm performance across enterprises either with or without public sector control by using VAIC method. During 2010 and 2015, studies analyzed at over 200 publicly listed firms in Malaysia. The study discovered that IC has a favorable impact on company performance and is crucial in improving firm performance, with HCE and CEE being more important than SCE in terms of firm performance. Government ownership, on the other hand, is detrimental to the success of a business. HCE performed better in non-government-owned businesses than in government-owned businesses.

S. Mohamad & Bujang (2019) assessed the impact of intellectual capital on Malaysian financial businesses from multiple viewpoints which are the efficiency of intellectual capital and also the impact of intellectual capital on business performance which measure by ROA. The data for this research was based on the published annual reports of 21 financial listed companies on the Malaysian stock exchange, Bursa Malaysia, from 2011 to 2015. According to the findings, there seems to be a significant relationship amongst VAIC and return on investment (ROI), with a higher VAIC value resulting in a better ROI. Firms with greater levels of CEE, HCE, and SCE contribute to financial performance in a positive way.

3. Research Methodology

3.1 Data Collection

Data regarding the Takaful operators in Malaysia is obtain from annual report provided on each company's websites. The data on financial statement included from 2015 until 2019 to analyze using RBC, Claim Ratio and Intellectual Capital methods accordingly. This study has included all Takaful operators that have been registered under BNM as licensed financial institutions.

3.2 Methods

3.2.1 Claim Ratio

A Claim Ratio will analyze the amount of real payments that insurers or Takaful providers are spent out of the total premiums or donations that they obtain from the policyholders. In this situation a high ratio will reflect a reduced risk profile and a more productive business. The value of the net claim incurred and net contributions are provided in each company's financial statement. The value for net claim incurred will be in bracket since the value indicates the amount of claim that company has paid throughout financial year. The formula to calculate Claim Ratio is stated per below:

$$\text{Claim ratio} = \text{Net claim incurred} / \text{Net contribution} \quad (1)$$

3.2.2 Risk-Based Capital

To calculate the RBC ratio, every insurance operator will be sorted out on the basis of the formula Capital Adequacy Ratio (CAR). Through CAR, financial strength of the operator will be evaluated whether it fulfills the supervisory requirement of capital through computation total capital available (TCA) and total capital required (TCR). The TCA value on each takaful fund are well-provided in the financial statement of every Takaful operator. Therefore, no calculation on TCA will be compute. The TCR for takaful will be calculated based on capital charges on both takaful funds and shareholder funds. Below is the CAR formula that evaluates the sufficiency of available capital to cover the necessary capital needed which comes in the form of companies and shareholder's fund:

$$\text{CAR} = \frac{\text{TCA}}{\text{TCR}} \times 100\% \quad (2)$$

3.2.3 Intellectual Capital

According to a study made by Pulic (2000), a list of steps will be applied to VAIC score. Below is the VAIC formula:

$$\text{VAIC}^{\text{TM}} = \text{VACA} + \text{VAHU} - \text{SCVA} \quad (3)$$

where

Value Added Capital Employed: $\text{VACA} = \text{VA} / \text{CA}$

Value Added Human Capital: $\text{VAHU} = \text{VA} / \text{HU}$

Value Added Structural Capital: $\text{SCVA} = \text{SC} / \text{VA}$

VACA is the value addition to the capital employed and CA is the capital employed that is equivalent to the gross asset book value minus the intangible asset. Thus, VA is revenue generated by a company usually extracted from the two sources of Human Capital (HU) and Structural Capital (SC). Since wage is not considered as expense because such forms of costs play a significant and important role in profit production and are known as capital, thus we may quantify value added using the following expression:

$$VA = OP + EC + D + A \quad (4)$$

where,

VA: value added,

OP: operational profit,

EC: employee cost,

D: depreciation,

A: amortization.

We will calculate VAHU which is the calculation of the HU cost showing the benefit contributed to each dollar charged as the salary of the workers. Another component is SCVA which means the efficiency of structural capital. The formula is as below:

$$SC = VA - HU \quad (5)$$

4. Analysis and Findings

4.1 Claim Ratio Analysis

An insurance company is considering having good performance by clients, investors or existing policyholder whenever Claim Ratio incurred by that particular insurance company is higher. This will build trust from policyholders and investors on that company's achievement. However, from the perspective of insurer itself, high Claim Ratio indicates they gain lower profits based on their company's performance which then might affect their future progress.

The table shows that incurred Claim Ratio for Prudential BSN company is lowest for family takaful fund which means this company gain quite high profit after paying the claim amount throughout the five-year interval. However, for general fund, Prudential BSN is in great loss in the year 2018 as the incurred Claim Ratio is highest among ratios that have been evaluated. This is because the amount of claim received by the company is greater than the contributions. Apart from that, Etiqa Berhad, Hong Leong MSIG and Takaful Ikhlas Berhad encounter lower profits since the incurred Claim Ratio for family takaful fund are higher.

Table 1: Claim Ratio of 15 Takaful operators according to takaful fund

Company	Year	Claim Ratio		Company	Year	Claim Ratio	
		Family Takaful	General Takaful			Family Takaful	General Takaful
AIA	2015	62.93%		Prudential BSN	2015	29.28%	3.35%
	2016	65.51%			2016	31.54%	10.01%
	2017	68.13%			2017	32.96%	8.95%
	2018	64.55%			2018	32.49%	2272.73%
	2019	74.01%			2019	33.26%	NA
AmMetLife	2015	62.50%		Sun Life	2015	54.04%	
	2016	82.78%			2016	50.67%	
	2017	76.04%			2017	64.11%	
	2018	76.52%			2018	49.14%	
	2019	74.10%			2019	84.71%	
Etiqa	2015	70.26%	63.81%	Syarikat Takaful Malaysia Berhad	2015	66.12%	26.49%
	2016	79.50%	55.59%		2016	64.21%	36.94%
	2017	90.26%	56.79%		2017	53.89%	45.90%
	2018	73.17%	58.65%		2018	52.90%	49.14%
	2019	108.70%	62.28%		2019	41.65%	47.08%

FWD	2015	63.61%		Takaful Ikhlas Berhad	2015	77.35%	40.65%
	2016	67.80%			2016	111.86%	60.15%
	2017	56.81%			2017	94.52%	49.32%
	2018	72.79%			2018	70.69%	60.93%
	2019	123.30%			2019	93.62%	30.52%
GreatEastern	2015	44.08%		Zurich Takaful Berhad	2015	70.10%	70.84%
	2016	46.08%			2016	56.77%	71.81%
	2017	49.61%			2017	73.09%	NA
	2018	48.86%			2018	51.77%	63.69%
	2019	69.99%			2019	68.69%	67.46%
Hong Leong MSIG	2015	79.49%	17.72%				
	2016	77.99%	26.43%				
	2017	75.07%	36.62%				
	2018	69.38%	NA				
	2019	82.54%	NA				

4.2 Risk-Based Capital Analysis

The table below shows the level amount of capital required by BNM for each takaful fund of either family takaful or general takaful according to the fifteen listed Takaful operators.

Table 2: RBC amount per fund of 15 Takaful operators

Company	RBC (%)										
	Family Takaful						General Takaful				
	2015	2016	2017	2018	2019	Average	2015	2016	2017	2018	Average
AIA	35.99	24.89	23.91	68.76	61.64	43.04	-				
AmMet Life	100.48	115.35	61.30	55.47	45.32	75.58	-				
Etiqa	342.84	482.75	384.56	221.61	214.72	329.30	528.58	767.50	610.23	78.78	496.27
FWD	299.18	297.61	349.21	389.46	397.49	346.59	-				
Great Eastern	29.93	45.47	36.83	40.37	8.53	32.22	-				
Hong Leong MSIG	162.91	126.23	91.96	80.21	115.90	115.44	229.61	332.58	339.32	327.96	307.37
Prudential BSN	12.05	12.00	102.62	95.14	84.02	61.17	156.86	160.35	157.45	143.45	154.53
Sun Life	142.82	135.74	87.93	135.30	122.75	124.91	-				
Syarikat Takaful Malaysia Berhad	171.71	173.90	175.74	139.18	183.97	168.90	250.96	321.78	307.73	260.53	285.25
Takaful Ikhlas	39.62	34.67	28.23	21.19	23.78	29.50	192.63	159.66	84.28	175.96	153.13
Zurich Takaful	132.67	332.83	866.18	500.14	381.24	442.61	116.12	258.58	1202.55	374.46	487.93

Table 2 shows that Etiqa Berhad, Syarikat Takaful Malaysia Berhad and Zurich Takaful Berhad for both general and family takaful business achieve the satisfied amount of capital required by BNM in RBC frameworks which is 130%. Meanwhile, for company that only provides family business, FWD is considered to follow the requirement of supervisory target capital level with the CAR amount of 346.59%. For general business, the average of CAR amount for five-year interval are considered to be good since those companies able to achieve the minimum capital required by having more than 130% amount of capital.

4.3 Value-Added Intellectual Capital Analysis

The following tables display the VAIC score for year 2015 and 2019 along with its three components value according to fund made by fifteen Takaful operators.

Table 3: VAIC value in 2015

Year	Company	Value Added Intellectual Capital (VAIC)							
		Family Takaful				General Takaful			
		VACA	VAHU	SCVA	VAIC	VACA	VAHU	SCVA	VAIC
2015	AIA	-0.7074	1.0791	0.0733	0.4450	-			
	AmMet Life	-1.1029	1.4769	0.3229	0.6968	-			
	Etiqa	-0.5593	15.7758	0.9366	16.153	-1.4269	254.2975	0.9961	253.8667
	FWD		1.1820	0.1540	1.3360	-			
	Great Eastern	-2.2987	2.5533	0.6083	0.8629	-			
	Hong Leong MSIG		1.1708	0.1459	1.3166		1.3374	0.2523	1.5896
	Prudential BSN	9.7954	-2.8051	1.3565	8.3469	-2.8202	1.0377	0.0363	-1.7461
	Sun Life	0.3436	4.2571	0.7651	5.3658	-			
	Syarikat Takaful Malaysia	-3.2809	3.4926	0.7137	0.9253	-1.6330	1.7383	0.4247	0.5301
	Takaful Ikhlas	0.4017	1.5165	0.3406	2.2588	2.3288	1.6100	0.3789	4.3176
	Zurich Takaful	-2.4818	1.0317	0.0307	-1.4194	NA	1.1430	0.1251	1.2681

Table 4: VAIC value in 2019

Year	Company	Value Added Intellectual Capital (VAIC)								
		Family Takaful				General Takaful				
		VACA	VAHU	SCVA	VAIC	VACA	VAHU	SCVA	VAIC	
2019	AIA	-0.0791	0.4048	-	1.4704	-1.1447	-			
	AmMet Life	-0.8311	1.7199	0.4186	1.3074	-				
	Etiqa	-0.8448	22.3426	0.9552	22.4531	-1.5152	1.8842	0.4693	0.8382	
	FWD	13.3360	1.0064	0.0064	14.3487	-				
	Great Eastern	-1.0464	2.1040	0.5247	1.5823	-				
	Hong Leong MSIG	0.1048	1.3842	0.2775	1.7665	0.0325	1.1893	0.1592	1.3810	
	Prudential BSN	16.8787	-5.9184	1.1690	12.1292	-2.5638	1.2052	0.1703	1.1883	
	Sun Life	0.2964	3.2308	0.6905	4.2177	-				
	Syarikat Takaful Malaysia	-2.8669	6.7069	0.8509	4.6910	-0.3084	1.6673	0.4002	1.7592	
	Takaful Ikhlas	0.6643	1.6368	0.3890	2.6901	2.4136	1.3905	0.2808	4.0849	
	Zurich Takaful	0.0863	-306.6216	1.0033	-305.5320	-0.7510	2.8801	0.6528	2.7819	

In the year of 2015, referring to the family takaful fund column in Table 3, Etiqa surpassed all other 14 Takaful operators with the VAIC score of 16.1531. Followed by Prudential BSN and Sun Life

with the score of 8.3469 and 5.3658 respectively. Meanwhile amongst 6 general Takaful operators, Etiqa is the top performer with the score of 253.8667, followed by Takaful Ikhlas and Hong Leong MSIG with the score of 4.3176 and 1.5896 respectively. According to the above analysis, the top performer for both type of fund amongst Takaful operators remains with Etiqa, therefore this company outshined other Takaful operators by showing the highest score of VAIC for both categories.

Table 4 shows the top performers for family takaful fund remain with Etiqa, FWD and Prudential BSN. Meanwhile for general takaful, the top performers are Takaful Ikhlas, Zurich Takaful and Syarikat Takaful Malaysia Berhad. In conclusion, the higher the VAIC score, it indicates that the Takaful operators have an excellent management stewardship since they managed to utilize their resources efficiently.

4. Conclusion

Different techniques will provide different assessment on performance of Takaful operators, therefore combination of several techniques can enhance better performance of Takaful operators in future. Intellectual Capital technique must be incorporate by Takaful operators and other industry in assessing their company's performance as the technique covers overall aspects of the company, not focus only on financial aspect. For insurance companies, it is good to keep assess their Claim Ratio because they able to predict whether their business can maintain sufficient capital or not in the future, for them to meet their customers' protection demand. RBC indicator is indeed a mandatory part for all insurance operators to meet in order to avoid any supervisory authorization by BNM. As a consequence, further studies need to be carried in much more relevant circumstances whereby the study period must contain longer period to produce accurate results and also by including more financial ratios to observe Takaful operators both in short and long term in terms of its operational and financial performance. Also, it is recommended that intellectual capital will be a significant topic for future research towards Takaful industry.

References

- Akhter, W., and Khan, S. U. (2017). Determinants of Takaful and conventional insurance demand: A regional analysis. *Cogent Economics & Finance*, 5(1):1291150.
- Alipour, M. (2012). The effect of Intellectual Capital on firm performance: An investigation of Iran insurance companies. *Measuring Business Excellence*, 16(1), 53–66.
- Bontis, N. (1998). Intellectual Capital: an exploratory study that develops measures and models. Management decision.
- BNM, B. (n.d.). *BNM Annual Report 2018*. Retrieved February 17, 2021, from <https://www.bnm.gov.my/-/bnm-annual-report-2018>
- Das, S. C. (2017). Status of Incurred Claim Ratio of Non Life Insurance Companies in India : An Status of Incurred Claim Ratio of Non Life Insurance Companies in India : An Appraisal Dr S C Das , Associate Professor , faculty of Commerce , BHU , Varanasi-5. October.
- Malaysia, I. (2020). *Financial year 2019*. Retrieved February 20, 2021, from <https://www.ism.net.my/financial-year-2019/>
- Muhamat, A. A., Jaafar, M. N., and Alwi, S. F. S. (2017). General Takaful claims: An experience of Takaful operator in Malaysia. *Journal of Emerging Economies and Islamic Research*, 5(4):18-26.

- Nasution, Z., Adiba, E. M., and Abdulrahim, M. O. (2019). Comparison Analysis of Risk-Based Capital (Rbc) Performance and Its Effect on Islamic Insurance Profitability in Indonesia and Malaysia. *Al-Uqud : Journal of Islamic Economics*, 3(2):149.
- Pulic, A. (2000). VAICTM – An Accounting Tool for Intellectual Capital Management. *International Journal Technology Management*, 20:702–714.
- Rehman, W. U. (2013). Intellectual Capital performance and its impact on financial returns of companies: An empirical study from insurance sector of Pakistan. *African Journal of Business Management*, 5(20):8041–8049.
- Remli, N., and Rosman, M. M. R. (2018). Firms' characteristics: a preliminary study of family Takaful demand in Malaysia. *International Journal of Accounting*, 3(14):01-14.
- Tarsono, O., Ardheta, P. A., and Amriyani, R. (2020). The Influence of Net Premium Growth, Claim Ratio and Risk-Based Capital on the Financial Performance of Life Insurance Companies. In *Annual International Conference on Accounting Research (AICAR 2019)* (pp. 65-68). Atlantis Press.



**20
21** **ICMS**
INTERNATIONAL CONFERENCE ON COMPUTING,
MATHEMATICS AND STATISTICS

e ISBN 978-967-2948-12-4



9 7 8 9 6 7 2 9 4 8 1 2 4